

of the American Gos-Hawk being so unlike that of its European congener, besides remarking on some other points; but the length of our article warns not to try further the patience of our readers.

We cannot, however, conclude without referring to the loss we have recently experienced in the removal from among us of one of the oldest, if not the very oldest, of British egg-collectors. The frequenters of the meetings of the Linnæan and Zoological Societies will henceforth look in vain for the kindly smile and hearty greeting of John Drew Salmon, one of the pioneers of oological discovery, and an active member of that band of zealous working men which numbered in its ranks Hoy and Heysham and Yarrell, besides others still happily spared to us. Long may they continue to enjoy the results of their hard-earned labours, and that they may be succeeded by a generation as indefatigable as they themselves were, is, we are sure, as much their wish as it is ours. Mr. Salmon, we are informed, has bequeathed his valuable cabinet of eggs to the Linnean Society, where we trust it will be preserved intact, as a monument to the memory of a thoroughly single-minded man, and an example to future naturalists of the care and discretion necessary in forming an eminently trustworthy oological collection.

September, 1859.

XLIII. *On the Ornithology of Northern Africa.* By the Rev. H. B. TRISTRAM, M.A., F.L.S. (Part III. *The Sahara, continued.*)

[Continued from p. 301.]

44. PRATINCOLA RUBETRA. (Whinchat.)

45. PRATINCOLA RUBICOLA. (Stonechat.)

Both Stonechat and Whinchat are common in the oases as winter visitants. The plumage of *P. rubicola* in the Sahara is much richer in colour than in specimens obtained on the coast, which are in their turn more brilliantly marked than the generality of our British specimens. I have had, through the kindness of Sir W. Jardine, an opportunity of examining a series of the South African species (*Pratincola pastor*, Strickland), and

find that none of my North African birds equal it in the purity of the black on the upper parts, nor have they the distinct distribution of colour on the shoulders and flanks, from which Mr. Strickland defined the species. Yet, on arranging a series from various localities, it seems almost impossible to draw the precise line between the local varieties or species of this almost cosmopolitan bird.

46. *RUTICILLA MOUSSIERI*. (Moussier's Redstart.) "*Zinzukh*," Arab.

This most beautiful and charming of all the Algerian birds was first obtained by me in 1855, near Boghar, on the southern slope of the Western Atlas. This is, I believe, its extreme northern range in the western part of Algeria, and it has not been observed, so far as I am aware, in the province of Oran or in Morocco. But in Tunis it approaches nearer the coast, and was there discovered by Mr. Fraser some years before Leon Olph-Gaillard described it in 1852 in the 'Proceedings' of the Natural History Society of Lyons. It is an attractive little bird, as well in its plumage as in its habits and song, partaking of the characteristics both of the Redstart and the Stonechat, between which it appears to be a link. In the northern Sahara it is very scarce, but increases in numbers as we advance southwards, being always to be found in the gardens and palm-groves, and generally in the thickets of the dayats. In the whole of the M'zab country it is abundant, and its lively note and repeated cry, whence its name "*Zinzukh*," may be heard about all the fruit-trees.

In the male bird the whole under plumage and upper tail-coverts are of a bright chestnut-red, as is the tail, with the exception of the lower portion of the two middle rectrices; the head and back black, with the feathers slightly fringed with brown; white forehead and line over the eye—broad white epaulets, and a broad white patch on the outer webs of the secondaries. The nest is compact, composed externally of sticks and moss, and internally of fine hair and wool, placed usually close to the ground in a low bush. The eggs, four in number, are of the size and shape of those of the Tithys Redstart (*Ruticilla tithys*), but of a delicate white suffused with a delicate greenish hue, unlike those of any other

bird I ever saw, and which can scarcely be described on paper. In the eastern province we obtained several nests as far north as Batna.

47. *DANDALUS RUBECULA*. (Robin.) A winter visitant to the oases.

48. *CURRUCA ATRICAPILLA*. (Black Cap.)

49. *CURRUCA HORTENSIS*. (Garden Warbler.)

50. *CURRUCA ORPHEA*. (Orphean Warbler.)

51. *SYLVIA CURRUCA*. (Lesser Whitethroat.)

52. *SYLVIA CINEREA*. (Whitethroat.)

All these five Warblers are common winter residents in the oases, and among the bushes of the ravines.

53. *SYLVIA CONSPICILLATA*. (Spectacled Warbler.) "*M'zil*," Arab.

The common and characteristic Warbler of the whole Sahara. Everywhere it appears to be a constant resident, resorting to the open grounds, where it haunts the small bushes and *Staticeæ*, living indifferently on the salt marshes or on the more exposed and bleak plateaux. It does not appear ever to resort either to the oases or the dayats, and so far differs in its habits from all its congeners. Affecting no concealment, it hops in front of its pursuer from bush to bush, searching for small beetles among the roots of each. More than one or two are never seen together, but it is impossible to ride far without detecting it. In the spring of 1857, we found many nests placed about a foot from the ground in the centre of small low bushes in the north-eastern plains near the Nememcha country north of Biskra. The nest is deep, very artistically constructed, and contains four or five eggs, not larger than those of the Willow Wren, and much resembling the paler varieties of the White-throat's. I never observed any with the dark spots which are general on the latter.

54. *SYLVIA DESERTICOLA**, Tristram, Ibis, 1859, p. 58. (Desert Warbler.)

Found only in the southern portion of the Desert, where it

* *Stoparola deserti*, Loche, Rev. Zool. 1858, p. 394 pl. 11. fig. 1 (fig. pess.).—Ed.

seems partially to take the place of the Spectacled Warbler. I have seen it in localities where I should not have expected to find its congener, on the great plains where there were no shrubs or plants. It differs from the former in the colour of the top of the head, which is rufous instead of ash colour, and in the throat, neck, breast, and belly, which are of a uniform pale sand-colour, while the Spectacled, besides its whiter chin and dark throat, has a rich vinous tint down the whole of its flanks. Similar as the two birds are in winter dress, I can feel no hesitation as to the distinctness of these species, having frequently obtained both in neighbouring or the same localities at the same time of the year. I was unfortunately unable to visit the haunts of *S. deserticola* in the breeding season.

55. MELIZOPHILUS PROVINCIALIS. (Dartford Warbler.)

Abundant in winter in the dayats, but never approaching the oases or the habitations of man. I do not believe that it is sedentary in the Sahara, but retires to the mountains to breed. I have taken several nests in the Atlas in the months of May and June.

56. PHYLLOSCOPUS TROCHILUS. (Willow Wren.)

57. PHYLLOSCOPUS RUFUS. (Chiffchaff.)

58. PHYLLOSCOPUS BONELLII. (Bonelli's Warbler.)

Abundant in the oases in winter, but retiring northwards at the end of February. The Chiffchaff especially assembles in thousands in the palm groves of El' Aghouat. The Arab name for all three species is "*Millil*."

59. CETTIA SERICEA. (Cetti's Warbler.)

60. HIPPOLAIS POLYGLOTTA. (Melodious Willow Wren.)

61. HIPPOLAIS PALLIDA, Gerbe. (Pale Warbler.)

Is not this identical with *Sylvia elaica* of Lindermayer? It is found in the marshes about Tuggurt in considerable abundance, and I have taken many nests south of the Atlas.

62. CALAMOHERPE TURDOIDES. (Great Sedge Warbler.)

63. LUSCINIOPSIS SAVII. (Savi's Warbler.)

The former seen and heard, the latter heard, frequently du-

ring winter in the sedges round the Sebkha, Waregla, N'goussa, and Tuggurt.

64. *AËDON GALACTODES*. (Rufous Sedge Warbler.)

This bird, certainly no true *Salicaria* or Sedge Warbler, was frequently observed in the Desert during winter, hovering about the outskirts of watered gardens or hopping among the tamarisk-trees. But as its breeding habits came under our notice very constantly in the Atlas, I shall defer all further notice of this eccentric Warbler for the present.

65. *DRYMOÏCA STRIATICEPS**. Tristram, Ibis, 1859, p. 58.

In one and only one locality did I meet with this most graceful Warbler. On the route between N'goussa and Témaçin we had halted for a few hours by the salt-lake of Aïn Bahrdahd, one of the most extensive of the few natural wildernesses of the Desert, and which had not at that time been visited by any European. Wandering in the swamp in pursuit of *Crateropus fulvus*, I was struck by a clear long-drawn call of five notes, unlike any I had ever heard—*whēē-why-whe-whē-hēē*. It was long before among the tamarisks I could descry the songster, whom I at length observed, now running up the boughs like a Creeper, and then poising himself on a twig with his tail perpendicularly expanded and jerking it backwards and forwards. I only obtained a pair, but saw two or three others. Captain Loche has, I believe, since obtained it at the same spot. It occasionally poises itself in the air and suddenly drops down again among the long grass. The whole upper portion of the body is of a delicate ash-brown, reddish towards the tail, and the feathers on the crown having a dark streak down the centre of each; the eyebrows whitish; a narrow black mark between the eye and the gape of the beak; the primaries brown; the tail a darker brown, except the outer rectrices, which are white, and the next pair with a white patch at the extremity. The whole under plumage white, with a faint rufous tinge on the flanks; tarsi and bill a pale orange colour. Whole length 4·25 inches, wing 2·75, tail 2·1, tarsi 0·75, bill 0·5. The sexes are similar in plumage.

* *Malurus sahara*, Loche, Rev. Zool. 1859, p. 395. pl. 11. fig. 2.—ED.

The occurrence of this little bird in perhaps the most isolated locality of the whole Sahara is very interesting.

66. *CRATEROPUS FULVUS* (Desf.). "*Erbib el Hadjel*," Arab., *i.e.* the Adopted Son of the Partridge.

This bird, discovered by Des Fontaines in the last century, forms one of the features of Saharan ornithology, numerous wherever there are trees either wild or cultivated, and as noisy and garrulous as the Starling, whom it much resembles in its manner of flight. It flies very straight with its long tail expanded, and is very wary. Often secreting themselves by threes and fours in a shrub, these birds remain closely concealed, till at the pursuer's near approach they silently steal away close to the ground to the next bush. They are generally in companies of seven or eight. Invariably do they alight at the foot of the tree or bush, and then noiselessly creep up to the very top, descending in line on the other side, except one sentinel who remains perched on the topmost bough to give the alarm of danger. Often as I have watched them, I never saw them omit this precaution. The note is very peculiar—*chur-churr-r-r—wheer-wheer-wheer*. The nest is a loose fabric of sticks and fine roots and straws; and I was told by the Arabs that they lay a blue egg, which Captain Loche has since had forwarded to him, and of which I have received a specimen. They are considered good eating by the French Spahi officers, and have wonderful medicinal qualities according to the Arab Hakeems. I found the flesh bitter and dry. The sexes are alike in plumage. On dissection I have found the gizzard filled indiscriminately with beetles and seeds.

67. *MOTACILLA ALBA*. (White Wagtail.) "*M'sissi*," Arab.

68. *BUDYTES FLAVA*. (Yellow Wagtail.)

Both extremely abundant wherever there is moisture, saline or fresh, all through the winter. The White Wagtail is both scattered and frequently in vast clouds. Of the Yellow I have found the two varieties *flava* and *cinereocapilla*, but did not in the Desert meet with the lighter-coloured extreme, *B. rayi*, nor with the darker-headed variety, so common in the East, *B. melanocephala*.

None remain during the summer, though *B. flava* breeds in the Atlantic district.

69. *ANTHUS CAMPESTRIS*. (Tawny Pipit.)

Abundant on the Hauts Plateaux. Not seen further south.

70. *ANTHUS PRATENSIS*. (Meadow Pipit.)

71. *ANTHUS ARBOREUS*. (Tree Pipit.)

Both obtained apparently on passage, the former in large, the latter in smaller flocks throughout the winter.

72. *OTOCORYS BILOPHA*. (Desert Horned Lark.) Temm. Pl. Col. 241. fig. 1.

This elegant and singularly-marked bird is by no means abundant anywhere in the Desert, but may occasionally be met with in parties of five or six on gravelly slopes,—never, so far as my observation goes, in the sandy districts. I have found it not far from the dayats. Heuglin's remark is, "It is certainly only a variety of *Alauda alpestris*. I found it only in Arabia Petræa in summer. In winter it did not occur to me there." (Vög. Nord-ost Afrik. p. 43.) This was also the impression of the informant of Capt. Loche, on whose authority *O. alpestris* is mentioned as Algerian. My experience so far differs from Dr. Heuglin's, that I found the bird *throughout* the winter, the labels on my specimens ranging from November to March, in localities precisely similar to Arabia Petræa. There is a considerable difference in size between the two species, my series of *O. bilopha* rarely exceeding $5\frac{3}{4}$ inches in length, and the length of wing 3·8 inches, while *O. alpestris* is usually 7 inches in length, and the wing from carpal joint $4\frac{1}{4}$ inches. The black tufts of feathers or horns extend in the male ·9 inch behind the eyes, which considerably exceeds the length of the corresponding tuft in any specimens I have seen of *O. alpestris* in the breeding-season; and though the relative distribution of the plumage is similar in both birds, yet the coloration is of so very distinct a hue that it is difficult for me to believe in the identity of the species. There is not a trace of yellow in the plumage of *O. bilopha*, its place being supplied by the purest white; and the whole upper plumage, scapulars, and wing-coverts are of a uniform rich isabel colour, paler than in any other Desert-lark, except

Ammomanes pallida. It would be remarkable and unusual were the same species, which is migratory as far as the Arctic circle, to be found resident on the arid plains of Arabia and Africa under conditions so dissimilar from those of its northern habitats.

73. CALANDRELLA BRACHYDACTYLA. (Short-toed Lark.)

Many flocks occur in winter in the neighbourhood of the oases and on the northern limits of the Sahara. It breeds abundantly under the slopes of the Atlas, but not, so far as I am aware, in the Desert.

74. CALANDRELLA REBOUDIA, Loche, MSS.; Ibis, vol. i. p. 58. (Reboud's Lark.)

I have retained the name given to this bird, in honour of Dr. Reboud, a zealous Algerian naturalist, by Capt. Loche, although he has not yet published a description of the species. It differs from *C. brachydactyla* in having the outer portion of the external rectrices of a pure white, and the beak much shorter and stouter, besides the usual pale coloration so distinctive of Desert birds. It is, unlike its congener, a permanent resident in the Desert, and has a wide lateral range, as I have obtained it in the western Sahara, and have received a female specimen, with a nest of four eggs, taken a little to the south of El Djem, in the Regency of Tunis. The eggs are like large varieties of *C. brachydactyla*. I am not aware of the two species ever occurring in the same localities. The present is most probably merely a Desert form of its congener.

75. AMMOMANES ISABELLINA (Temm.); Consp. Av. p. 244. (Desert-Lark.)

Occurs first on leaving the Hauts Plateaux in small numbers, but is more plentiful further south, inhabiting the open plains, where it is difficult to conceive how it finds subsistence. Its lateral range is wide. I have obtained it from the frontiers of Morocco to Arabia Petræa. It is sedentary, and breeds both in the Algerian Sahara and in the wilderness of Judæa, in both which localities I have taken the nest, neatly formed of grass in a depression under a tuft of weeds, and with four eggs, in size nearly equal to those of *Galerida cristata*, but never so elongated, measuring 11 lines by 8 lines, of a rich cream colour, blotched,

especially towards the large end, with brown and red spots. In its habits this very distinct species exhibits, so far as I am aware, no distinctive peculiarities, living in small flocks, and poising itself in the air like its congeners. Its notes are few, though not unmelodious, and its song will bear no comparison, either in volume or sweetness, with that of the Skylark. It varies considerably in size, but its average length is about $6\frac{1}{2}$ inches.

76. *AMMOMANES PALLIDA*, Cab., Mus. Hein. p. 125. *A. elegans*, A. Brehm. (Pale Desert-Lark.)

This Desert Lark may be distinguished at a glance from the former, not only by its inferior size, as it measures only about $5\frac{1}{2}$ inches in length, and wing from carpal joint 3·8 inches, but more especially by the distinct black bars on the extremities of the rectrices and primaries. Its whole plumage, too, as its name implies, is of a paler colour, and without the reddish hue which pervades *A. isabellina*. The beak is very stout and conical, only 4 lines from the gape, while that of *A. isabellina* measures 6 lines. It is more strictly confined to the southern Sahara, never being found in the northern or rocky districts, and though not scarce in its localities, is rather solitary in its habits, more than two or three being very rarely observed together. Its flight is jerking and short; nor have I noticed it poise itself on the wing. Its notes are very varied and melodious, but not powerful. The egg is peculiar, similar in shape to that of *Caland. brachydactyla*, measuring 9 lines by 7; the ground-colour dingy white, and covered over its whole surface by very minute brown spots, but never blotched.

77. *AMMOMANES REGULUS*; Bp., Compt. Rend. xlv. p. 1066 (1857): Rev. et Mag. de Zool. 1857, p. 283. (Little Desert-Lark.)

This beautiful little Lark, first described by Prince Bonaparte from specimens procured for him by Capt. Loche, is decidedly the smallest of its genus, measuring from $4\frac{1}{2}$ to $4\frac{3}{4}$ inches in length, and in length of wing from carpal joint 3·4 inches. In general coloration it resembles the preceding species, but is on the whole paler in its hues, the flanks being pure white instead of sand-colour; and the breast, which in *A. pallida* is of a very pale isabel, is in *A. regulus* white, with faint traces of pale isabel

on the centre of some of the feathers. But the most characteristic difference is in the coloration of the primaries and rectrices. The former are only faintly tipped with blackish brown; and on the tail, instead of a broad bar of black, there is a triangular mark, commencing on the inner edge of the external rectrices, and extending at its apex half an inch on the central quill. The tarsi, feet, and bill are of a dingy white. It is a very scarce bird, and only occurs on the southern limits of the Sahara, near Waregla, and in the southern portion of the Chamba territory.

78. *ALAUDA ARVENSIS*. (Skylark.)

Stated by Capt. Loche to visit the Sahara in winter, but never came under my observation.

79. *RHAMPHOCORIS CLOT-BEY*. (Cavaignac's Lark.) *Melanocorypha clot-bey*, Bp. Consp. Av. p. 242. *Ierapterhina cavaignacii*, Des Murs, Rev. Zool. 1851, p. 25, pl. 1.

This grotesque and singular-looking bird is found in small flocks on the mountain-sides south of El Aghouat. I never heard of its being obtained in any other locality, nor did I ever meet with it but on one occasion, when I obtained four specimens. In its flight it resembles the other Larks, and at first sight, from the broad black and white bands on the secondaries, might be taken for *Certhilauda desertorum*. It runs with great rapidity, and is very shy. The whole of the upper plumage is ruddy isabel. The neck and breast whitish, with large round black spots occupying the centre of each feather; cheeks and moustache black, with a white subauricular spot; throat white. Primaries brownish black; secondaries black, with the lower third part pure white; rectrices sandy white, with a small brownish-black spot on the inner web of the external feathers, increasing in each feather, until in the centre one it occupies a third of the whole length. Tarsi and feet covered with very prominent white scales; hind claw not equalling the length of the toe. But the most singular feature of the bird is its bill, which is, I believe, without an analogue. It is very solid, conical, and arched, .7 inch from the gape, and .5 inch perpendicular diameter, stone colour, but black at the tip. The lower mandible has a sharply-cut notch on each side about the centre, over which a semicircular

portion is scooped out of the upper mandible, leaving a crescent-shaped aperture, through which a straw may be passed, and then at an acute angle fitting closely down on the lower mandible, which, though notched, is perfectly straight along its whole centre line.

Total length $6\frac{1}{2}$ to $6\frac{3}{4}$ inches. Wing from carpal joint 5 inches. Tarsi .9 inch.

80. *MELANOCORYPHA CALANDRA*; Bp. Consp. Av. p. 242. (Calandra Lark.)

Though swarming on the coasts, and by far the most common Lark in the Tell, the Calandra soon becomes scarce in the interior, and can only doubtfully claim a place in the Sahara list. The two specimens I obtained on its edge are decidedly larger than those of the plains on the other side the Atlas, measuring 8 inches in length, with beaks more robust and longer than in other specimens, .8 inch from the gape instead of .6 inch, but do not exhibit any further specific distinction.

The Calandra is in high esteem by French epicures, and ranks among the best '*gibier*' of the Algerian chasseur.

81. *GALERIDA CRISTATA*. (Crested Lark.) "*Goubah*," Arab.

In the north of the Sahara. Further south its place is supplied by its congeners.

82. *GALERIDA ABYSSINICA*; Bp. Consp. Av. p. 245. (Abyssinian Crested Lark.)

The commonest Lark of the Desert, though scarcer in the southern districts. It differs only in colour from the *G. cristata*, being of a rufous isabel hue on the upper parts, with darker lines down the centre of each feather. Its eggs resemble pale varieties of its congener.

83. *GALERIDA ISABELLINA*; Bp. Consp. Av. p. 245. (Isabel-line Crested Lark.)

This very distinct variety is far less abundant than the last, being confined to the most desolate districts. It is much smaller, shorter by at least an inch, with its hues more uniformly pallid, and the darker mark down the centre of each feather almost obliterated. Its bill is of similar proportions, in no way differing from that of *G. cristata*. I do not find the remark of

Prince Bonaparte, as to the crest being longer, to hold good uniformly. I obtained one nest, the eggs of which resemble pale-coloured varieties of *G. cristata*, but are scarcely larger than those of *Calandrella brachydactyla*.

84. *GALERIDA ARENICOLA*, Tristram, *Ibis*, vol. i. p. 58. (The Sand Lark.)

This bird may be at once distinguished from its congeners by its bill, which is extremely elongated, slender, and curved, its length being $\cdot 9$ inch from the gape. The total length is from $6\frac{1}{2}$ to $6\frac{3}{4}$ inches, being the full dimensions of *G. abyssinica*. Its coloration also is similar, but paler, and the flanks and belly are suffused with a faint isabel hue. From its beak, and general conformation, it seems to be a link between the genera *Galerida* and *Certhilauda*. I met with it only in the extreme east of the Algerian and in the Tunisian Sahara. Circumscribed by these almost unexplored tracts, it has probably hitherto escaped the observation of naturalists.

85. *GALERIDA MACRORHYNCHA*; Tristram, *Ibis*, vol. i. p. 57. (Long-billed Crested Lark.)

Unlike its congeners, this bird, by far the largest of its genus, appears only to resort to the northern edge of the Sahara, where its lateral range extends from Morocco to Tripoli. As might be anticipated from its habitat, its plumage partakes only in a slight degree of the sandy hues which mark the true Desert habitants, although very much paler than any Crested Larks obtained in Europe or in the Tell. It is unnecessary to repeat the diagnosis already given in 'The Ibis,' but its size will at once prevent it from being mistaken for any other species. Its whole length is 7·8 inches, wing 4·5, tail 2·8, beak 1·0, tarsi 1·05. The form of its bill resembles that of *G. arenicola*, but, though curved, it is not so slender, and is stouter and more compressed at the base. In both species the extremity of the bill is rounded and dilated, instead of running to a point as in other *Galeridæ*. This may probably arise from its habit of constantly digging into the soil for its food, from which cause also the capistra are generally much worn and the nostrils bare. It is very abundant near El Aghouat, where I first re-

marked it following the labourers in a barley patch, after the manner of a rook. It appears to be confined to those districts where there is water and cultivation. I was not fortunate enough to meet with it in the breeding-season. I presume that this is the species catalogued, but not described, by Captain Loche as *Galerida randonii*, as I first drew his attention to the bird as new, and supplied him with specimens in 1857.

86. *CERTHILAUDA DUPONTI* (Vieill.) ; Bp. Consp. Av. p. 246. (Dupont's Lark.)

This elegant and delicately marked bird—a link between *Galerida* and *Certhilauda*, beautifully illustrative of the gentle gradations by which Nature glides from one type to another—is, I believe, the very rarest of all the Larks of the Sahara. I found it only in the far south, in the Wed Nça, at which place it was also obtained by Captain Loche a few months afterwards. Neither of us ever saw more than two or three pairs. The white outer tail-feathers give it the appearance at first sight of our common Skylark, for which indeed it passed with my companion, who was the first to shoot it. Captain Loche obtained a nest of four eggs, one of which he kindly presented to me. As might have been expected, the eggs differ much from the typical characteristics of the Lark. They are very round, $9\frac{1}{2}$ lines by 8, of a soiled white colour, with pale brown blotches sparsely scattered over the surface, bearing a strong resemblance to small varieties of *Lanius excubitor*, but with an ivory polished surface.

87. *CERTHILAUDA DESERTORUM* (Stanley) : Bp. Consp. Av. p. 246. (Bifasciated Lark.)

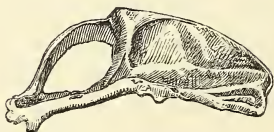
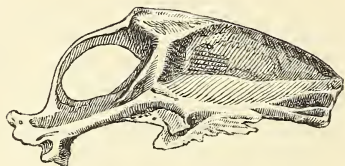
Universally distributed throughout the whole of the true Desert. Unlike its congeners, it seems to be a most solitary bird, and seldom, except in the breeding-season, have I seen even two together. But a day rarely occurred when we did not obtain a few specimens on the march ; and indeed this game formed our principal and favourite animal food. Although its uniform of inconspicuous drab renders it most difficult of detection on the ground, its restless habits soon attract attention. The moment it extends its wings, the broad black bar across the snow-white secondaries attracts the eye and renders it an easy

mark. At first sight it reminded me much of a Plover in the manner in which it rose and scudded away. Indeed there is nothing of the Lark in its flight, except in early morning, when I have watched it rise perpendicularly to some elevation and then suddenly drop, repeating these gambols uninterruptedly over exactly the same spot for nearly an hour, accompanying itself by a loud whistling song. It runs with great rapidity, and it requires no little speed of foot to capture a broken-winged victim. In the stomach of those I opened I found small coleoptera, sand-flies, and hard seeds. There is something very graceful in all its movements, and the distinct markings of its wings and the expansion of its long black tail render it really a beautiful bird when flying.

The egg is very large, 12 lines by 8; the ground-colour like that of *C. duponti*, but the brown blotches smaller and far more closely distributed, especially towards the broader end. It would not be easy to select it out of a series of some varieties of *Lanius excubitor*.

88. *CERTHILAUDA SALVINI*, Tristram, Ibis, vol. i. p. 57. (Salvin's Lark.)

I have ventured to describe this bird as a species, and to name it after my friend Osbert Salvin, one of the most zealous of our young ornithologists, and the most amiable of travelling companions, though I am aware that it may be termed a local race more properly than a species. Its length is 7·8 inches, the wing 4·5, tail 3·1, tarsi 1·3,



being about 1·5 inch shorter than *C. desertorum*. I found I could always distinguish the species on the wing by the broader white on the secondaries. It is also a much more slender bird, and the difference in the size of the skeleton is far greater than would have been imagined from the appearance of the skins in a cabinet.

To the accompanying sketches of the sterna of the two species I subjoin their comparative measurements:—

	<i>C. desertorum.</i>	<i>C. salvin.</i>
	inch.	inch.
Joint of furculum to posterior end of sternum	1·7	1·4
Depth of keel	·45	·375
Length of keel	1·1	·8
Span of arch of keel	·7	·6

The smaller species I met with only in the southern and south-eastern districts, never in the central or western; but where it occurred, it by no means supplanted the commoner bird. I found, on consulting Captain Loche, that he had arrived independently at the same conclusion as myself, that there were two species, *i.e.* as species are now made.

Writing with a series of about 100 Larks of various species from the Sahara before me, I cannot help feeling convinced of the truth of the views set forth by Messrs. Darwin and Wallace in their communications to the Linnean Society, to which my friend Mr. A. Newton last year directed my attention, "On the Tendency of Species to form Varieties, and on the Perpetuation of Varieties and Species by natural means of selection*." It is hardly possible, I should think, to illustrate this theory better than by the Larks and Chats of North Africa.

In all these, in the congeners of the Wheatear, of the Rock Chat, of the Crested Lark, we trace gradual modifications of coloration and of anatomical structure, deflecting by very gentle gradations from the ordinary type; but when we take the extremes, presenting most marked differences. Are these extremes, it may be asked, further removed from each other than the Guinea Negro or the Papuan is from the typical Caucasian? and are these species aboriginal and indigenous, or are they developed by climatic and other local causes? I think the latter alternative almost demonstrable in the case of these birds. These differences of structure (I am using the word here in its widest sense, to include colour, form, and size) doubtless have a very direct bearing on the ease or difficulty with which the

* Journ. Proc. Linn. Soc. Zool. III. p. 45.

animal contrives to maintain its existence. In the Desert, where neither trees, brushwood, nor even undulation of surface afford the slightest protection from its foes, a modification of colour, which shall be assimilated to that of the surrounding country, is absolutely necessary. Hence, without exception, the upper plumage of every bird, whether Lark, Chat, Sylvian, or Sandgrouse, and also the fur of all the small mammals, and the skin of all the Snakes and Lizards, is of one uniform isabelline or sand colour. It is very possible that some further purpose may be served by the prevailing colours, but this appears of itself a sufficient explanation. There are individual varieties in depth of hue among all creatures. In the struggle for life which we know to be going on among all species, a very slight change for the better, such as improved means of escaping from its natural enemies (which would be the effect of an alteration from a conspicuous colour to one resembling the hue of the surrounding objects), would give the variety that possessed it a decided advantage over the typical or other forms of the species. Now in all creatures, from Man downwards, we find a tendency to transmit individual varieties or peculiarities to the descendants. A peculiarity either of colour or form soon becomes hereditary when there are no counteracting causes, either from change of climate or admixture of other blood. Suppose this transmitted peculiarity to continue for some generations, especially when manifest advantages arise from its possession, and the variety becomes not only a race, with its variations still more strongly imprinted upon it, but it becomes the typical form of that country. If it be objected that we see many varieties which do not become hereditary, we may reply, that these varieties having experienced changes not advantageous to their means of existence, may from that very cause become extinct. Still there are many which continue, as the Pied Raven of the Faroe Islands, and the Tailless Manx Cat.

To apply the theory to the case of the Sahara. If the Algerian Desert were colonized by a few pairs of Crested Larks,—putting aside the ascertained fact of the tendency of an arid, hot climate to bleach all dark colours,—we know that the probability is, that one or two pairs would be likely to be of a darker

complexion than the others. These, and such of their offspring as most resembled them, would become more liable to capture by their natural enemies, hawks and carnivorous beasts. The lighter-coloured ones would enjoy more or less immunity from such attacks. Let this state of things continue for a few hundred years, and the dark-coloured individuals would be exterminated, the light-coloured remain and inhabit the land. This process, aided by the above-mentioned tendency of the climate to blanch the coloration still more, would in a few centuries produce the *Galerida abyssinica* as the typical form. And it must be noted, that between it and the European *G. cristata* there is no distinction but that of colour.

But when we turn to *Galerida isabellina*, *G. arenicola*, and *G. macrorhyncha*, we have differences not only of colour but of structure. These differences are most marked in the form of the bill. Now to take the two former first. *G. arenicola* has a very long bill, *G. isabellina* a very short one; the former resorts exclusively to the deep, loose sandy tracts, the latter haunts the hard and rocky districts. It is manifest that a bird whose food has to be sought for in deep sand derives a great advantage from any elongation, however slight, of its bill. The other, who feeds among stones and rocks, requires strength rather than length. We know that even in the type-species, the size of the bill varies in individuals, in the Lark as well as in the Snipe. Now, in the Desert, the shorter-billed varieties would undergo comparative difficulty in finding food where it was not abundant, and consequently would not be in such vigorous condition as their longer-billed relatives. In the breeding-season therefore they would have fewer eggs and a weaker progeny. Often, as we know, a weakly bird will abstain from matrimony altogether. The natural result of these causes would be that in course of time the longer-billed variety would steadily predominate over the shorter, and in a few centuries they would be the sole existing race, their shorter-billed fellows dying out until that race was extinct. The converse will hold good of the stout-billed and weaker-billed varieties in a rocky district.

Here are only two causes enumerated which might serve to create as it were a new species from an old one, yet they are perfectly natural causes, and such as, I think, must have occurred,

and are possibly occurring still. We know so very little of the causes which in the majority of cases make species rare or common, that there may be hundreds of others at work, some even more powerful than these, which go to perpetuate and eliminate certain forms "according to natural means of selection." But even these superficial causes appear sufficient to explain the marked features of the Desert races which frequently approach so very closely the typical form, and yet possess such invariably distinctive characteristics, that naturalists seem agreed to elevate them to the rank of species. The differences in size may be yet more simply explained by the facility or difficulty of sustaining existence in varying localities. On similar principles we may account for the existence of such a bird as *Galerida macro-rhyncha* in the warm, genial climate of the Oases, where, winter being unknown, and food always abundant and close at hand, every stimulus is afforded to a vigorous development, while its prey being generally hidden in the soft open mould of the gardens and barley patches, any tendency to elongation of the bill is fostered and encouraged, until we find a race two inches longer than *Galerida isabellina*, and with a bill exactly double in length (1 inch instead of .5).

A process precisely similar may be supposed to have developed the various species of Desert Chats, until we find in the desert of Souf that all distinctive trace of colour has been scorched out, and instead of the brightly clad *Saxicola stapazina*, we have no more cheerful representative of the genus than *S. homochroa*. Widely as these two extremes appear to be separated, yet a well-chosen series of the numerous African species of the class will exhibit a range of transitions so imperceptible, that it will be found very difficult without careful comparison to draw a line between one species and the next.

I cannot but hope that ere long ornithologists will systematically recognize, what is already admitted in a great degree by conchologists, the clear distinction between species and race. I do not see any difficulty in taking as the true definition of a species all the individuals who may reasonably be presumed to have a common origin, though among them there may exist races differing from one another even in a considerable degree.

I do not mean for a moment to imply that such birds as *Rham-*

phocoris clot-bey have been developed out of any known European form, or that we are to presume so far to limit Creative Power as to endeavour to explain the growth of Desert species *universally* by the development of individual peculiarities. Wherever may have been the centre whence they sprung, undoubtedly there are many creatures to be found there which could not have been developed by any conceivable process from other known races. But whilst it is contrary alike to sound philosophy and to Christian faith to doubt the creation of many species by the simple exercise of Almighty volition, still, knowing that God ordinarily works by natural means, it might be the presumption of an unnecessary miracle to assume a distinct and separate origin for many of those which we term species. We may speculate on the question for a life-time; this conclusion alone so far is certain,—that every peculiarity or difference in the living inhabitants of each country is admirably adapted by the wisdom of their beneficent Creator for the support and preservation of the species.

89. *LANIUS DEALBATUS*, De Filippi: Bp. Rev. Zool. 1853, p. 293. "*Boorass*," Arab. (The Pallid Shrike.)

While its numerous congeners who resort to the coast of North Africa are all migrants, the Pallid Shrike, which never transgresses the northern limits of the Desert, remains a permanent resident, breeding very early not only in the trees of the oases, but in the low jujubes and prickly shrubs of the dayats. Its nest and eggs in no way differ from those of the Great Grey Shrike, which it much resembles in size and general appearance. It is a remarkably fearless bird, and will remain calmly perched on the outmost edge of a palm leaf while a party is sitting and talking beneath the shade of the tree. It is extremely abundant in all the oases, and its plaintive cry may be heard in every dayat. I once saw one feasting on an impaled Dartford Warbler, but its usual food appears to be the large *Baps* which swarms in myriads through the dayats and weds. Under the old nests at least a bushel of beetle wings might be collected, and the insects hang impaled on every jujube thorn around. This is not a solitary bird, though hardly gregarious, but three or four may generally be found not far apart. It is

a special object of dislike to the Willow Wren, whose clamours frequently disturb its noontide siesta.

No other Shrike came under my observation in the winter, nor did any appear to halt in the Desert on their vernal migration, though on our return to the coast we found that at least five species had arrived from the south.

90. *HIRUNDO RUSTICA*. (Chimney Swallow.)

A few pairs of Swallows remained all the winter in each oasis; but none of those observed were in mature plumage, and I therefore presume that it is only the younger and weaker birds who stay behind. The Arabs informed me that for one swallow they have in winter they have twenty in summer, and that they usually retire about the end of November, returning in February. Certainly very few had arrived by the end of February, though in the beginning of that month I saw myriads on the wing at Biskra, which must have remained for some time in that neighbourhood, as they did not reappear in any considerable numbers in Tunis till the beginning of March. But throughout the whole winter a few were to be seen wherever there was water or marsh. The natives are perfectly familiar with the fact of the migration of vast flocks to the south, which all go, as they say, to Timbuctoo, the El Dorado of Arab and Swallow.

91. *COTYLE RUPESTRIS*. (Rock Swallow.)

I saw two of these birds in December in a ravine in the M'zab country.

92. *COTYLE RIPARIA*. (Sand Martin.)

A few at El Aghouat in November. They did not appear to winter in the Sahara, and can only, I imagine, be stragglers there at any time, as the weds and oases afford them but few conveniences for nidification.

93. *CHELIDON URBICA*. (House Martin.)

Exactly the same remarks will apply to this bird as to the Chimney Swallow. A few pairs may everywhere be seen throughout the winter, while in summer, I am told, there is not a hovel without several building in the corners of the doorways, where their nests may generally be seen. Those I shot were in immature plumage.

94. CUCULUS, sp. — ?

I once chased for nearly an hour a very small Cuckoo, not far from Tuggurt, of a uniform sand-colour, with the long tail characteristic of the genus. Though several times very near it, I did not succeed in obtaining it; but some months afterwards I saw a skin of the same, or a most closely-allied species, in the possession of M. Hénon of Batna, the only other specimen I ever met with. I cannot refer the bird to any of those in the catalogue of Heuglin (his *Cuculus ruficollis* I do not know); and so convinced was M. Hénon that his specimen was unique, that he was unwilling to allow me to measure or describe it. In repose the bird at a distance is not unlike *Crateropus fulvus*, but is a little smaller. I met with it on a vast level chott or hard sand-plain, far away from any cover.

95. MEROPS APIASTER. (Bee-eater.) “*Leemoon*” or “*Mey-moona*,” Arab.

A few stragglers occurred in November.

96. UPUPA EPOPS. (Hoopoe.) “*Thibeeb*,” Arab.

Great numbers of Hoopoes resort to the M'zab cities and those of the other oases during the winter, where they are assiduous in searching the dunghills, and strut about all the court-yards and among the tents with the familiarity of barn-door fowls. They are held in much reverence by the natives for their medicinal and magical virtues, and are never molested. It is no praise to our superior civilization to reflect that the Hoopoe might be one of our regular English summer visitants but for the reckless selfishness of every fool who can handle a gun, and out of mere wantonness must needs destroy, on its first arrival, one of the most beautiful and certainly the most graceful of the feathered inhabitants of Europe. A few pairs remain in the weds to breed, but the greater proportion leave the Sahara in summer.

97. CYPSELUS MELBA. (White-bellied Swift.)

98. CYPSELUS APUS. (Common Swift.)

Both these birds resort to the cliffs and the mosque-towers for nidification, but, unlike the Swallow and Martin, retire altogether in winter to still more southern regions. The Common Swift had not left El Aghouat during the first week of November.

[To be continued.]